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Equipment Used by Deciduous Fruit Growers in Handling Bulk Boxes

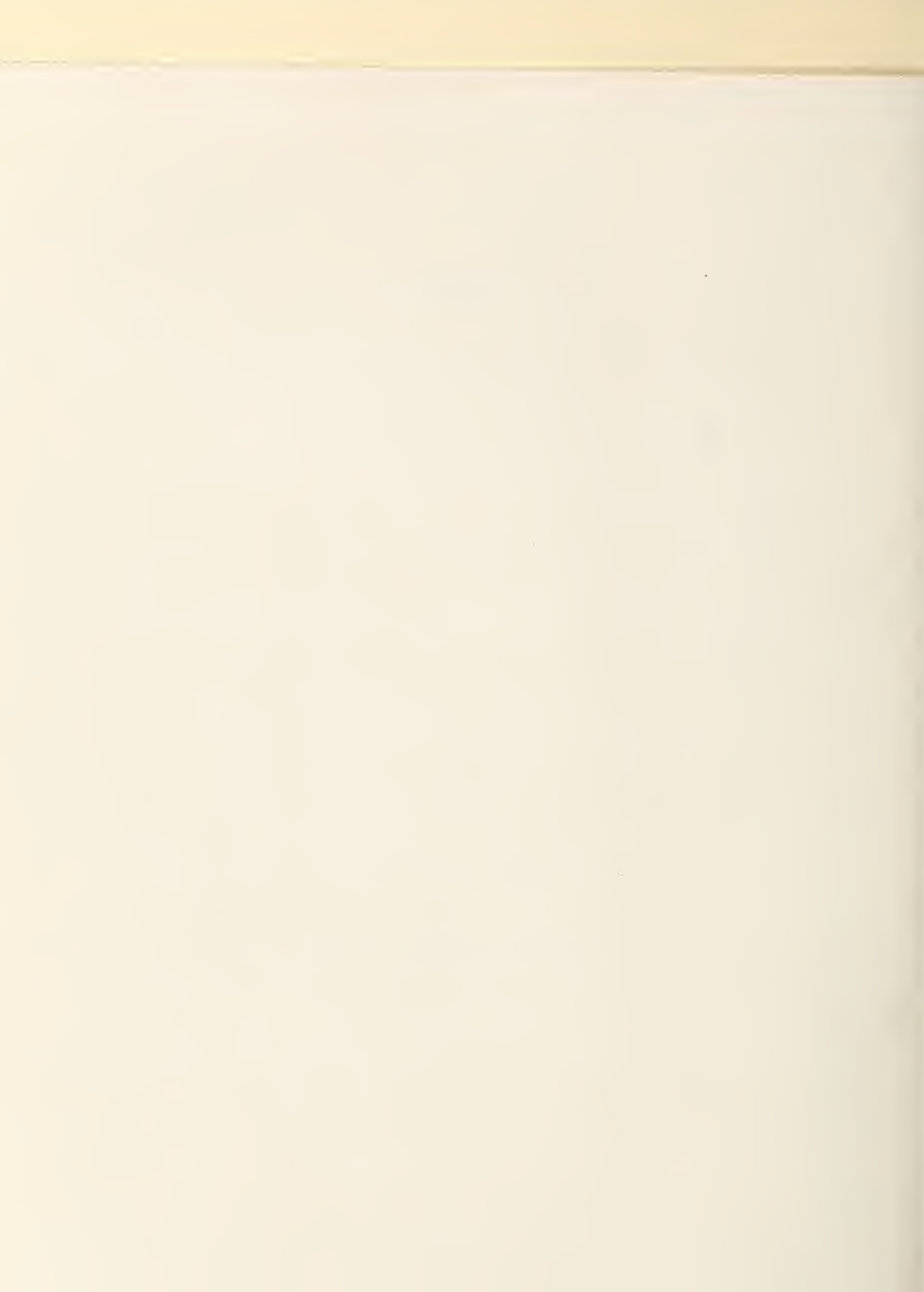


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EQUIPMENT USED BY DECIDUOUS FRUIT GROWERS IN
HANDLING BULK BOXES 1/

By

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The practice of handling fruit in bulk boxes having a capacity of 16 to 25 bushels is rapidly becoming standard in most of the major apple-producing areas of the United States.^{4/} It is estimated that during the 1957 season 4,000,000 bushels of fruit were moved in bulk boxes. This is a considerable increase over previous years, and the indications are that this trend will continue.

Industrial fork-lift trucks have been used by fruit growers on surfaced areas in and around farm storages and packing houses since 1950. While at first these machines were used in handling palletized unit loads, they later proved just as useful in handling bulk boxes. To achieve the maximum advantages of bulk-handling methods, the boxes must be filled in the orchard. A filled box weighs from 800 to 1,500 pounds depending on its size and the kind of fruit it contains. Inasmuch as filled bulk boxes cannot be handled manually, power equipment is necessary in the orchard as well as at the loading dock and in the packinghouse and the storage room.

Industrial lift trucks are heavy, with small tires and a minimum of under-clearance. Because of these facts, it is impractical to use them on anything but hard, smooth-surfaced areas. This means that they cannot be operated successfully on the relatively soft, uneven ground found in the orchard. However, during the last few years, self-powered machines and tractor attachments designed to handle bulk boxes in the orchard have

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^{4/} Gaston, H. P., and Levin, J. H. Handling Apples in Bulk Boxes. Mich. Agr. Expt. Sta. Spec. Bul. 409, 19 pp. 1956.

been developed and made available. These machines make it possible to lift, move, and in some cases stack filled bulk boxes quickly and easily. They range in price from \$50 to several thousands of dollars.

A brief discussion of the types of bulk-box handling equipment commonly used by fruit growers follows.

Fork Attachments for Three-Point Hydraulic Hitches

Growers who have tractors that are equipped with three-point hydraulic hitches can adapt them for handling bulk boxes by bolting forks to the hitch (fig. 1). The necessary labor and materials cost approximately \$50. An attachment of this sort will lift bulk boxes approximately 18 inches. While a tractor equipped in this way cannot be used for stacking, it can be used to move filled boxes from the orchard to an on-the-farm packinghouse or storage. It may also be used to move filled boxes to a nearby loading area where they can be transferred to road trucks. When high-stacking lift equipment is not available at the loading area, trucks and/or trailers can be loaded by providing a dock or pit. Facilities of this kind can be constructed quickly and inexpensively. Most growers employ the services of a bulldozer and make the retaining walls of the handling unit from posts and wood planks.

Growers who use three-point-hitch attachments in handling bulk boxes must be careful not to exceed the capacity of the hydraulic system of the tractor involved. Capacities range from 900 to 2,000 pounds, depending on the size and type of tractor. When the system is overloaded, leaks tend to develop and mechanical difficulties are likely to occur.

Fork Attachments for Buck Rakes and Hayloaders

Many fruit growers have buck rakes or hayloaders which they use for moving brush and snow. Forks may be bolted to such equipment (fig. 2) at a labor and material cost of approximately \$50. If this equipment is to be used in handling bulk boxes, it is desirable to add a third cylinder enabling the operator to keep the forks level while they are being raised or lowered. Doing so will add approximately \$50 to the cost of the unit. Although buck rakes and hayloaders are not designed primarily for handling unit loads, they can, when adapted, be used for loading trucks and other operations involving moving and stacking boxes.

Although these units are reasonably effective, they do have limitations. The valves commonly used make it difficult to move the forks smoothly. The location of the forks (in front of the tractor) makes it difficult for the operator to see them when they are at or near the ground. The front ends of most tractors are not designed to carry heavy loads. When bulk boxes are handled with buck rakes or hayloaders, the



Figure 1. Forks have been bolted to a three-point hitch, and the unit is being used to move filled boxes out of the orchard.



Figure 2. Bulk boxes have been stockpiled at the edge of the orchard. A hayloader attachment has been fitted with forks and a leveling cylinder. It is being used to load filled boxes onto a road truck.

added weight makes the tractor hard to steer and may cause mechanical failure. When the number of boxes to be handled with this equipment is considerable, the front axle should be reinforced, oversize tires be used, and the unit be equipped with power steering.

Fork-Lift Attachments for Tractors

Lift attachments which make it possible to lift and tilt the forks are available for both the front and rear ends of practically every tractor of standard make (fig. 3). These units operate in the same way as those found on industrial lift trucks. The units are serviceable and can be used for lifting, moving, high stacking, and loading bulk boxes. They range in price from \$450 to \$1,000 or more, depending on their capacity, the height to which the forks can be raised, and other features.

Rear-mounted attachments are usually considered best. The operator can always see his work, and the weight of the load is carried by the heavy rear axle and large tires. Since steering is usually accomplished by moving the front wheels, a rear-mounted load is easier to maneuver.

More than 15 companies manufacture tractor lift attachments. Several tractor manufacturers also offer lift attachments designed especially for their own machines. Some growers purchase lift "masts" and make their own attachments. However, inasmuch as the cost of the mast is the major item of expense, the saving is relatively small.

Fork-Lift Tractors

At the factory tractors can be converted to relatively permanent fork-lift units (fig. 4). The lift mast is attached to the rear of the tractor. The gear box, steering mechanism, and driver's seat are all reversed. The driver faces the load, and most of the travel is in that direction. Several tractor manufacturers sell units that have been adapted in this way. The conversion, which includes the lift mast, usually adds \$1,200 or more to the original price of the tractor.

There are several independent concerns that will make the conversion described above on tractors of standard make for approximately \$1,000. Other companies offer units built on second-hand tractors for approximately \$1,500 complete.

Fork-lift tractors are easy to operate and are serviceable and effective. Many growers purchase these units because they feel that the convenience of operation, as compared to lift attachments, justifies the extra cost.

Fork-lift tractors cannot be used as conventional tractors unless the units are reconverted. Doing so requires the services of a competent



Figure 3. A fork-lift attachment has been mounted at the front end of this tractor. Units of this kind can be mounted on either the front or back. In this case the three-point hitch, in the rear, was fitted with forks.



Figure 4. A fork-lift tractor being used to load a road truck (in this case with celery). Although these units cost more than standard lift attachments, many growers feel that the increase in convenience more than justifies the added cost.

mechanic and is relatively expensive. This means that equipment of this sort should be purchased only when the volume of fruit to be handled is large or the unit is to be used continuously for several weeks or months.

Field Fork-Lift Trucks

Fork-lift units of industrial type are available which can be operated on the kind of terrain usually found in orchards. Most of these units are, however, too large and expensive for practical orchard use. One dual-purpose unit which sells for less than \$2,000 is available. Although most growers who buy this machine use it at the orchard dock, or loading area, it can sometimes be used to advantage in sodded orchards where the grades are not excessive.

Industrial Fork-Lift Trucks

These units are the most effective machines yet devised for lifting, moving, and stacking unit loads. Growers who pack their fruit and those who both pack and store it should provide themselves with industrial lift equipment.^{5/} Those who do so should choose the type of machine which will serve their purpose best. Lifts that are powered with either electric motors or gasoline engines are available. If the lift is to be used in an enclosed packinghouse or storage, the problem of exhaust fumes must be given careful consideration. Although mufflers designed to eliminate noxious fumes are available, when exhaust fumes are a problem an electrically powered unit usually proves to be more satisfactory.

Homemade Lift Units

Some growers make their own orchard lift units (fig. 5). This is usually done by shortening an old truck chassis, reversing the axle and steering mechanism and adding a lift mast. When well built, such a unit can be operated effectively in the orchard. The cost of the necessary material is approximately \$1,000. Growers who have well-equipped machine shops may be able to save money by building their own units.

Bulk-Box Trailers

If the distance from the orchard to the packinghouse, storage, or loading area is such that a round trip can be made in 20 minutes or less, bulk boxes can be moved economically by orchard lift equipment. When the

^{5/} Levin, J. H., and Gaston, H. P. Fruit Handling with Fork-Lift Trucks. Mich. Agr. Expt. Sta. Spec. Bul. 379, 25 pp. 1953.



Figure 5. The homemade lift shown here was made from an old truck. The work was done in a farm shop.

distances are greater, it is usually advisable to move the boxes on a low 2-wheel trailer. The wheels should be mounted on separate axles, one of which is at least 45 inches ahead of the other. This "staggered" arrangement makes it possible (by working from both sides) to load a box opposite each wheel.

Stone Boat Skids

Some growers use narrow homemade skids in distributing empty bulk boxes in the orchard. The boxes can be slid off such a skid by hand without damage to the container. In some cases they are used in moving filled boxes out of the orchard.

Straddle Carriers

In some cases growers who handle a large volume of fruit can use a straddle carrier for movement of fruit from the orchard to the packing-house. Straddle trucks or trailers are usually adapted lumber carriers which can pick up and move 8 to 14 boxes as a unit load. The boxes are

set on bolsters located at the edge of the orchard. The straddle carrier drives over the load of boxes and picks it up in a matter of seconds. This type of equipment is expensive and feasible only when it can be used continuously for 10 to 16 hours a day for several weeks.^{6/}

Pallets

Growers who use lift equipment in handling bulk boxes should provide themselves with at least a few pallets. Pallets make it possible to handle fertilizer, spray chemicals, and other materials as unit loads.

Bulk Boxes with Hinged Doors

Containers of this sort provide an excellent means of handling windfalls and cider stock. A bulk box with a hinged door can be held over a bulk body truck and emptied with a minimum of labor and effort (fig. 6). Growers should have a sufficient number to handle their undergrade fruit.

Bulk Box Dumpers

Growers who pack for the fresh-fruit markets should provide themselves with a dumper enabling them to empty the boxes with a minimum of fruit bruising (fig. 7). Suitable dumpers are available.^{7/} They cost from \$650 to \$900, depending on the design and capacity.

During the last 7 years, more than 500 Michigan fruit growers have provided themselves with equipment for handling bulk boxes. The trend toward bulk handling is almost sure to continue in Michigan and in other tree-fruit producing areas of the United States. Fork-lift equipment should be chosen with care. Growers who make the change should choose the necessary equipment on the basis of the volume of fruit to be handled and the nature of the operation. When this is done, the conversion is almost sure to improve the efficiency of the operation and increase net returns.

^{6/} Herrick, Joseph F., Jr., McBirney, Stanley W., and Carlsen, Earl W. Handling and Storage of Apples in Pallet Boxes. U. S. Dept. Agr., Agri. Marketing Serv. AMS-236, 41 pp. April 1958.

^{7/} Levin, J. H., and Gaston, H. P. A Bulk Box Dumper for Handling Fruit. Mich. Agr. Expt. Sta. Quarterly Bulletin 39, Article 39-55. 1957.



Figure 6. Cider apples being loaded into an outgoing truck. The hinged door facilitates emptying. Growers should provide themselves with enough boxes of this type to handle the undergrade fruit they produce.



Figure 7. The bulk box shown has been raised into dumping position and the fruit is beginning to flow out. The operator controls its flow by positioning the box and sometimes applying slight pressure to the hinged portion of the cover. Dumpers of this design are being used in most of the major fruit-producing areas of the United States.

PARTIAL LIST OF CONCERNS WHO MAKE
BULK-BOX HANDLING EQUIPMENT 8/

Concerns which manufacture industrial fork-lift equipment:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Automatic Company, Chicago 20, Ill.
Baker Industrial Truck Div., Cleveland 2, Ohio
Big Joe Mfg. Co., Wisconsin Dells, Wis.
Clark Equipment Co., Battle Creek, Mich.
Colson-Merriam Co., Baltimore 2, Md.
Economy Engineering Co., Chicago 24, Ill.
Elwell-Parker Electric Co., Cleveland 3, Ohio
Erickson Power Lift Trucks, Inc., Minneapolis 18, Minn.
Hyster Co., Portland 8, Oreg.
Independent Distributors, Portland, Oreg.
Kwik-Mix Co., Port Washington, Wis.
Lewis-Shepard Production, Watertown, Mass.
Lift Trucks, Inc., Cincinnati 14, Ohio
Mercury Mfg. Co., Chicago 9, Ill.
Mobilift Corp., Portland 14, Oreg.
Moto-Truc Co., Cleveland 3, Ohio
Prime-Mover Co., Muscatine, Iowa
Raymond Corp., Greene, N. Y.
Silent Hoist & Crane Co., Brooklyn 20, N. Y.
Towmotor Corp., Cleveland 10, Ohio
Transistor Truck Co., Portland, Oreg.
Yale & Town Mfg. Co., Philadelphia 15, Pa.

Tractor companies which make fork-lift units for their tractors:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
J. I. Case Co., Racine, Wis.
Caterpillar Tractor Co., Peoria, Ill.
John Deere Co., Moline, Ill.
Ford Motor Co., Tractor & Implement Div., Birmingham, Mich.
International Harvester Co., Chicago, Ill.

8/ Listing of companies and products is not to be construed as an endorsement of the firms and products by the U. S. Department of Agriculture over those not mentioned.

Companies which make lift attachments fitting most tractors:

Blackwelder Mfg. Co., P. O. Box 808, Rio Vista, Calif.
Calahan Engineering Co., 1100 Meteo St., Los Angeles, Calif.
Edwards Equipment Co., Yakima, Wash.
Farm Hand Co., Hopkins, Minn.
G & M Equipment Co., Winton, Calif.
Gladden-Hass, Inc., Owosso, Mich.
Henderson Mfg. Co., Cedar Rapids, Iowa
Holt Mfg. Co., 27 NE Broadway, Independence, Oreg.
Johns Mfg. Co., Lacota, Mich.
Kirkhof Electric Co., 2500 Buchanan St., SW, Grand Rapids, Mich.
Love Tractor Co., Eau Claire, Mich.
Michigan Orchard Supply, South Haven, Mich.
Plum Mfg. Co., 751 Martin Avenue, Santa Clara, Calif.
Portable Elevator Mfg. Co., Bloomington, Ill.
Sherman Products Corp., Royal Oaks, Mich.
Trac-Lift-MK Construction Co., Youngstown, Ohio
Wagner Iron Works, Milwaukee, Wis.

Companies that sell lift masts:

Groben Supply Co., 1139 South Wabash Avenue, Chicago, Ill.
K & D Co., Dallas, Tex.
Industrial lift companies (Clark, Hyster, Mobile Lift, etc.)

Companies that sell bulk-box dumpers:

Friday Tractor Co., Hartford, Mich.
Gladden-Hass, Inc., Owosso, Mich.
Hilltop Orchards Co., Hartford, Mich.
Materials Transportation Co., Chicago 39, Ill.
Michigan Orchard Supply, South Haven, Mich.
Northwest Equipment Co., Yakima, Wash.
Van Dorn Mfg. Co., Wenatchee, Wash.

